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Discovery by Design: The Department of Mechanical Engineering of the University of British Columbia. By Eric Damer. (Vancouver: Ronsdale Press, 2002. 226 p. ISBN 0-921870-95-7. \$29.95)

Eric Damer's *Discovery by Design* traces the institutional history of the Department of Mechanical Engineering of the University of British Columbia (UBC) from its origin in 1907 to the end of the 20th century. The primary focus of the study is to recount the department's transition from a small, chronically underfunded undergraduate teaching program to a world class department emphasizing graduate training and funded research. The author shows that this growth occurred in phases linked partly to the impacts of two world wars, but also to broad economic and disciplinary trends. Beyond this focus, Damer provides a range of anecdotal evidence from each period of the department's history regarding issues like student life, curriculum, faculty hirings, research activities, and links with other institutions such as the Association of Professional Engineers of British Columbia. A series of annexes to the main narrative list faculty members appointed to the department since its foundation, department heads, major donors to the department, the growth in numbers of graduating students, a list of alumni since 1919, and a photo gallery of departmental faculty and staff.

The author comes to this work from the discipline of educational studies rather than from history of science and technology, and the result is that several issues of particular interest to historians of engineering are not addressed. Three in particular deserve further study. First, the growth of university technical education in the 19th and 20th centuries was associated with ongoing curriculum debates. What and how should engineers be taught? Should their education focus principally on the mathematical and theoretical foundations of the discipline? Or should students spend most of their time in workshops and laboratories? And if the latter, how should their workshop and laboratory training be structured? Should it teach and replicate conditions in real, working shops and laboratories, or should its purpose be to foster a more limited understanding of basic principles of this kind of work, in order to guide research and design?

Although Damer provides anecdotal evidence on courses offered over the years, there is no attempt to provide any deeper analysis of the overall character of the curriculum and its evolution. To do would require a systematic survey of the curriculum and its content, in order to understand how a student's time was distributed. Such an analysis is important because engineering curricula varied enormously among universities. For example, certain schools in France required students

to spend most of their time studying mathematics and theoretical science (with no workshop), while others required students to spend the vast majority of their time in workshop; the decisions these schools took were closely tied to class issues. In the United States, the debate over theoretical work versus shop work was tied to the ongoing debate over the value of apprenticeship training for engineers. Some American educators and programs sought, through an overwhelming emphasis on workshop carried out in real shop conditions, to bring apprenticeship into the university (e.g. Worcester Polytechnic). What curricular choices did UBC's Department of Mechanical Engineering make, and why?

The second issue that needs further study is the character of this department relative to others in Canada, the United States, and Britain. Damer provides anecdotal evidence to suggest that it was shaped by both British and American traditions, and also by its early structural link to McGill. But again, there is no attempt to reach any conceptual understanding of how these influences played out in the department's evolution. Was the curriculum closer to that of a British University or an American? Or was it like neither? Was there a unique Canadian approach to curriculum development, and if so, where did the UBC's Department of Mechanical Engineering stand in relation to this trend? Did it spend most of the twentieth century attempting to catch up to longer-established universities like McGill, or did it pioneer trends that other Canadian universities then followed? In terms of the department's tradition of research, the answer would seem to be that it carried out very little until the post-WWII period. If this conclusion is correct, then it was not closely following trends in the United States, where many university engineering programs had strong research programs in place well before WWII. But with no attempt at comparative analysis, it is difficult to draw any conclusions about how UBC fits into the broader landscape of mechanical engineering education, either nationally or internationally.

The third issue concerns the student body, its origins, and its professional expectations. Did this department serve as an important facilitator of social mobility, or did it mainly train members of the middle class? And were there substantial changes in the student body over time? Again, the author chose not to address any of these issues systematically. There is no statistical analysis of student backgrounds, although some anecdotal evidence is offered concerning, e.g., the entry of women and ethnic minorities into the program at various times. Likewise, the big debates within Canada and the United States over engineering professionalization, licensing, and unionization are

hinted at in Damer's study, but are not explored in depth. Members of UBC's Department of Mechanical Engineering were involved in the development of the Association of Professional Engineers of British Columbia, but the reader is given little sense of how this organization fits within the broader ideological struggles over professionalization. An early recruiting flyer from 1919-1920 that is reprinted in the book suggests a unionization model of professionalization, but further anecdotal evidence suggests that, if this was initially the case, the organization soon became more conservative. But again, no attempt is made to address the problem explicitly.

Damer's study explores new terrain, and has thereby established an essential foundation for a better understanding of the development of technical education in British Columbia. But further structural and comparative research is necessary to explain how UBC's Department of Mechanical Engineering fits into the broader evolutionary spectrum of Canadian technical education and engineering professionalization.

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